

WHAT IS CLAIMED IS:

1. A slot array antenna, comprising:

5 a power feeding waveguide for feeding microwave power; and

10 a plurality of rectangular radiating waveguides connected to a plurality of windows which are disposed along the longitudinal direction of the power feeding waveguide, so as to guide the microwave power from the plurality of windows to the outside of the antenna;

15 wherein each of the radiating waveguides has a plurality of slots disposed along the longitudinal direction of the radiating waveguide; and the interval "d" between the centers of gravity of slot pairs or slots is substantially the same as the wavelength  $\lambda_m$  of the microwave in the rectangular radiating waveguide.

20 2. A slot array antenna according to claim 1, wherein the interval "d" between the centers of gravity of slot pairs or slots is in the range of  $0.75 \leq \lambda_m \leq 1.25$ , with respect to the wavelength  $\lambda_m$  of the microwave.

25 3. A slot array antenna according to claim 1 or 2, wherein the dielectric constant of a dielectric material disposed in the radiating waveguide is 1 or more.

4. A slot array antenna according to any one of claims 1 to 3, wherein the power feeding waveguide is a rectangular waveguide.

5. A slot array antenna according to any one of claims 1 to 4, wherein traveling wave is to be generated in the radiating waveguide.

30 6. A slot array antenna according to any one of claims 1 to 5, wherein a matching slot is disposed at the terminal end of the radiating waveguide.

35 7. A slot array antenna according to any one of claims 1 to 6, wherein the slots formed on one side of the radiating waveguide are disposed such that they are gradually deviated from the center axis in the

longitudinal direction of the radiating waveguide.

8. A slot array antenna according to any one of claims 1 to 7, wherein the slots provided on one side of the radiating waveguide are such that they form an 5 inclination angle of 45° relative to the center axis in the longitudinal direction of the radiating waveguide.

9. A slot array antenna according to any one of claims 1 to 8, wherein a slit having a variable width is disposed at the power feeding portions for feeding power 10 from the power feeding waveguide to the radiating waveguide.

10. A slot array antenna according to any one of claims 1 to 9, wherein the slots formed on one side of the radiating waveguide are selected from the group 15 consisting of: slots perpendicular to the traveling direction of the electromagnetic field, slot pairs in the form of "staggered  $\lambda$ ", and slot pairs each of which is inclined at about 45° with respect to the traveling direction of the electromagnetic field.

20 11. A plasma processing apparatus comprising:

                  a plasma processing chamber for subjecting an object to be processed to a plasma treatment; and 25                  antenna means for guiding microwave power into the plasma processing chamber so as to generate plasma in the plasma processing chamber;

                  wherein the antenna means comprises: a power feeding waveguide for feeding microwave power; and a plurality of rectangular radiating waveguides connected to a plurality of windows which are disposed along the 30 longitudinal direction of the power feeding waveguide, so as to guide the microwave power from the plurality of windows to the outside of the antenna, wherein each of the radiating waveguides has a plurality of slots disposed along the longitudinal direction of the radiating waveguide; and the interval "d" between the 35 centers of gravity of slot pairs or slots is

substantially the same as the wavelength  $\lambda_m$  of the microwave in the rectangular radiating waveguide.

12. A plasma processing apparatus according to claim 11, wherein the interval "d" between the centers of gravity of slot pairs or slots is in the range of  $0.75 \leq \lambda_m \leq 1.25$ , with respect to the wavelength  $\lambda_m$  of the microwave.